

IN THE SPECIFICATION

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Whilst not wishing to limit the scope of the invention, the following descriptions set forth various preferred configurations and features of the invention.

The thin film is deposited on preformed and/or thermally toughened substrates. The thin film is deposited with a uniformity of at least +/-20%, preferably a uniformity of at least +/-10%, and more preferably a uniformity of at least +/-5%. A power density of the plasma is below 5 Wcm⁻², preferably below 1 Wcm⁻², and more preferably below 0.5 Wcm⁻². A peak growth rate is at least 10 nm per second, preferably several tens of nm per second, and most preferably over 100 nm per second. A level of water and oxygen can be controlled to achieve target growth rates and to control unwanted side reactions, the oxygen level being below 5% and more preferably below 1%, and the water vapour levels being controlled preferably below 1% and more preferably below 0.1%.

The glow discharge plasma is preferably generated, between electrodes, by a low frequency source in which the frequency is below 100 KHz and preferably below 30 KHz. The electrodes are preferably selected from a material that reduces heat generation. The electrodes are made of metal, and preferably brass.

The invention can include a thermal control system in the coating region to maintain the substrate temperature at a desired level, wherein the thermal control system utilizes gas coolant, water coolant, liquid coolant, or combinations thereof. The thermal control system is configured to cool the coating region to reduce unwanted side reactions.

The invention can also include one or more gas flushing zones to allow introduction

and removal of the substrate from the coating region while maintaining integrity of the gas composition in the coating region.

As is evident from the above disclosure, the present invention can advantageously be used for depositing the thin film on a moving substrate of a continuous film or sheet, or a series of substrates supplied semi-continuously. The present invention can also be used for depositing a thick film or layers of different composition on a substrate by arranging sequential coating regions along a direction of movement of the substrate. Also, the method of the present invention coating can be used in combination with a different depositing method.